Common git repo for hosting Boot Firmwares – a Proposal

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Linux Plumbers Conference
Vienna, Austria | September 18-20, 2024

Speakers

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Nishanth has been working with TI for over 18 years. He is part of TI's Embedded Processing organization as a Linux/Systems architect working with the Jacinto and Sitara Processor families. He is also a long-time Linux kernel contributor and currently an active Linux kernel maintainer for TI's K3 device trees, among other things he does.

Vignesh Raghavendra, *Member Technical Staff, Texas Instruments*

Vignesh has been with TI for over 10 years. He is part of TI's Sitara MPU Software team as a Linux architect. He has contributed to various subsystems of Linux and U-Boot and Linux Kernel maintainer.

Problem statement

- To be able to build **complete** embedded systems out of public repos
  - Without relying on Vendor trees or websites
- Distros would need to include such vendor repos to build fully functional system
- Linux driver related firmwares are hosted on linux-firmware repo of kernel.org
  - No such thing exists for Boot critical firmwares

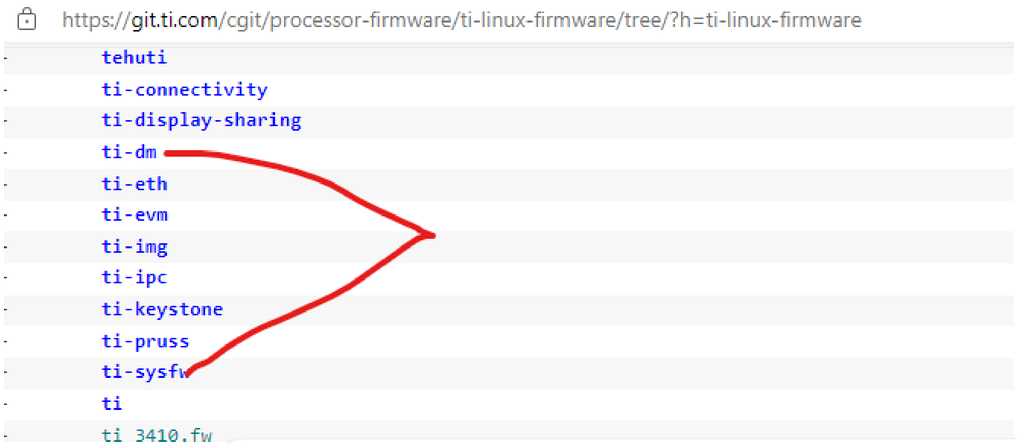
Board category of firmwares

- **IP firmware**: "specialized controllers" and require firmware for the operation (DDR controller firmware eg.:),
  - LPDDR firmwares of NXP, Rockchip etc, TI K3 SoCs has SERDES firmwares
- **Boot stage firmware**: Additional stages of the boot process involve vendor intermediate firmware, such as power configuration (SCMI /SCP or their proprietary equivalent). [1] [2] [3]
  - Proprietary bootloaders that run before open bootloader, Secure FW etc
- **Security enclave binaries**: Many PKA and PQC systems still require proprietary binaries for IP or audit reasons.
  - Firmwares driving crypto engines and security enclaves

Example

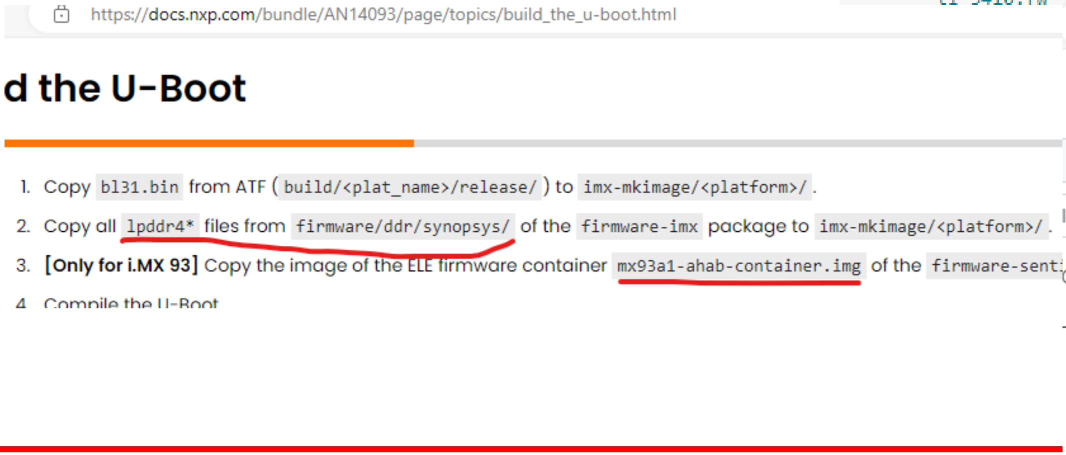
- Platform support is fully mainlined wrt various components
  - Distro – Poky / Armbian / Buildroot etc
  - Kernel - Torvalds tree
  - Bootloader – U-Boot by denx

Where do we find the firmwares?



https://git.ti.com/cgit/processor-firmware/ti-linux-firmware/tree/?h=ti-linux-firmware

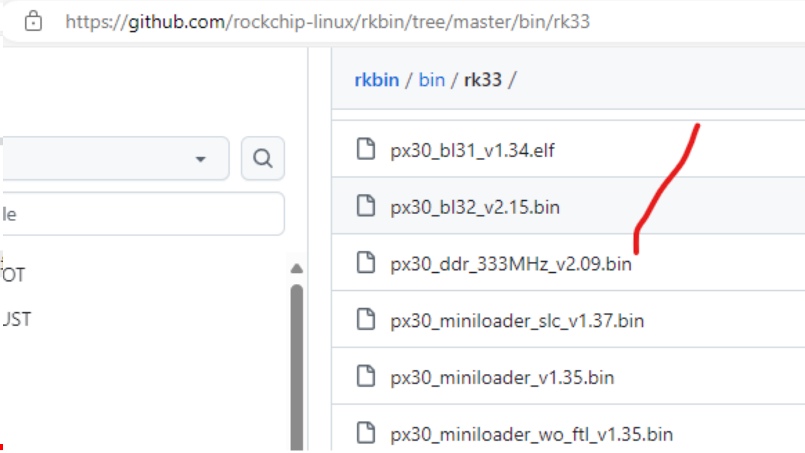
```
tehuti
ti-connectivity
ti-display-sharing
ti-dm
ti-eth
ti-evm
ti-img
ti-ipc
ti-keystone
ti-pruss
ti-sysfw
ti
ti_3410.fw
```



https://docs.nxp.com/bundle/AN14093/page/topics/build_the_u-boot.html

d the U-Boot

1. Copy `bl31.bin` from ATF (`build/<plat_name>/release/`) to `imx-mkimage/<platform>/` .
2. Copy all `lpddr4*` files from `firmware/ddr/synopsys/` of the `firmware-imx` package to `imx-mkimage/<platform>/` .
3. **[Only for i.MX 93]** Copy the image of the ELE firmware container `mx93a1-ahab-container.img` of the `firmware-sent`
4. Compile the U-Boot



https://github.com/rockchip-linux/rkbin/tree/master/bin/rk33

rkbin / bin / rk33 /

- px30_bl31_v1.34.elf
- px30_bl32_v2.15.bin
- px30_ddr_333MHz_v2.09.bin
- px30_miniloader_slc_v1.37.bin
- px30_miniloader_v1.35.bin
- px30_miniloader_wo_ftl_v1.35.bin

Proposal

- Common repo along the lines of linux-firmware
  - Host firmwares that are not available in source format or those that are tedious to build (has vendor toolchain dependency etc)
  - Licensing rules along the same lines as linux-firmware
  - Have in principle ACK from U-Boot custodian to host under https://source.denx.de/u-boot

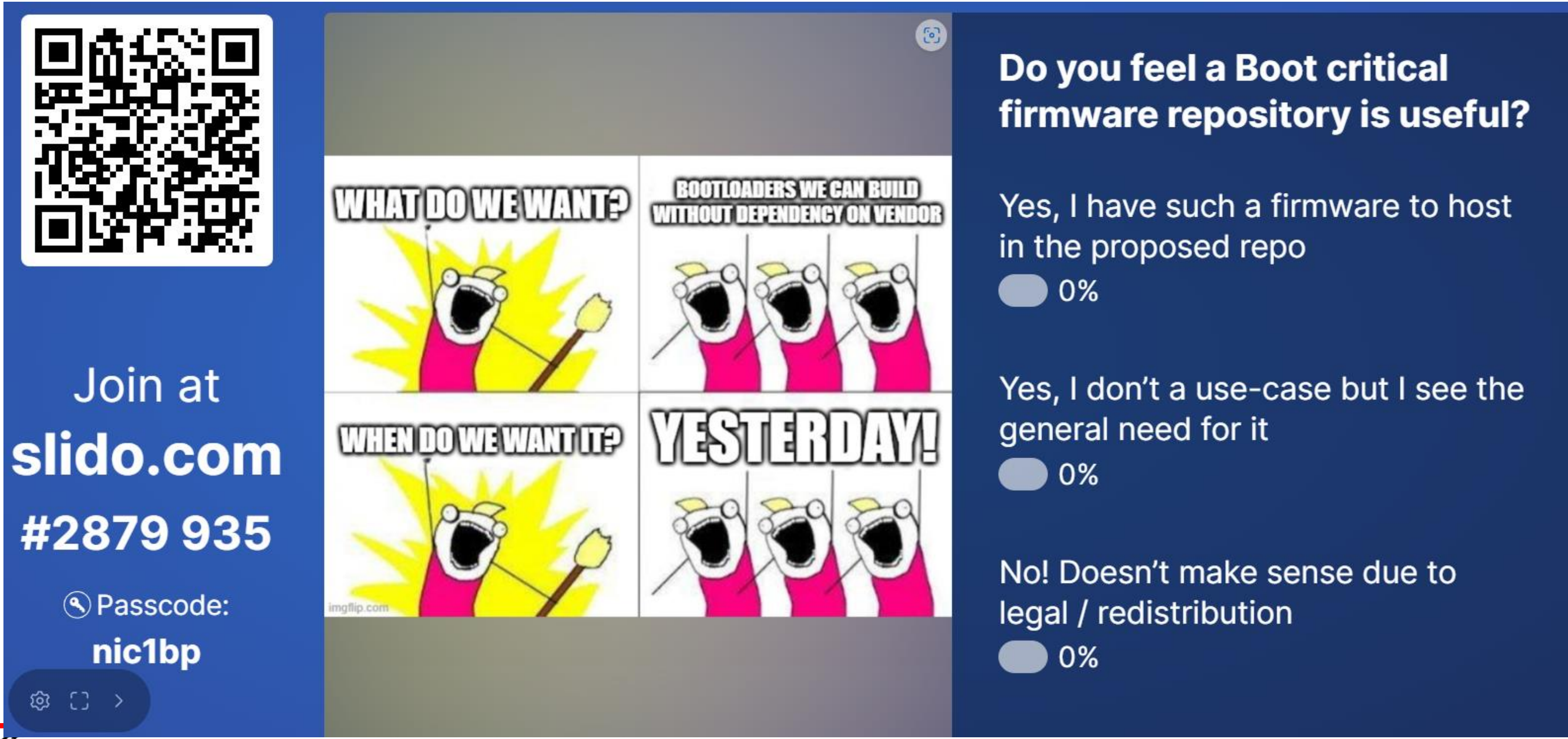
Advantages

- Bootloader build infrastructures take care of packaging such firmwares in standard way
  - Eg U-Boot has Binman [4]
- Distro friendly
- Clearer licensing and redistribution requirements

Call for Action

- Ack the proposal on U-Boot mailing list [4]
- If you have such Firmwares to be hosted, point us to the same
- Any other concerns and queries

Call for Action



Join at

slido.com

#2879 935

Passcode:

nic1bp

Do you feel a Boot critical firmware repository is useful?

Yes, I have such a firmware to host in the proposed repo

0%

Yes, I don't a use-case but I see the general need for it

0%

No! Doesn't make sense due to legal / redistribution

0%

References

1. TI K3 SoC bootloader

   https://docs.u-boot.org/en/latest/board/ti/k3.html#software-sources

2. NXP:

   https://docs.nxp.com/bundle/AN14093/page/topics/build_the_u-boot.html

3. Rockchip:

   https://bbs.t-firefly.com/forum.php?mod=viewthread&tid=2236

   rkbin/bin/rk33 at master · rockchip-linux/rkbin · GitHub

4. Binman

   https://docs.u-boot.org/en/latest/develop/package/binman.html

5. Proposal on U-Boot list:

   https://lore.kernel.org/u-boot/20240620213539.ftmjhphypssxp5n4@desolate/